AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. A method of treating a liquid slurry of comminuted cellulosic fibrous material under cooking conditions in a substantially vertical continuous digester, having at least one substantially annular screen surface, said digester having a substantially cylindrical wall with at least one diameter-changing transition below the cylindrical wall, said method comprising [the steps of] substantially continuously:

(a) introducing the slurry of comminuted cellulosic fibrous material into the digester adjacent the top thereof, to flow downwardly in the digester in a first cylindrical flow path having a first diameter and defined by the cylindrical wall;

(b) screening the slurry to remove liquid therefrom using the at least one screen surface, having a substantially constant screen surface opening size and percentage of open area, in the first flow path;

(c) during step (b) causing the slurry of comminuted cellulosic fibrous material to transition at the at least one diameter-changing transition from the first cylindrical flow path to a first diverging flow path having an initial second diameter;

(d) after step (c), moving the slurry downward in a second cylindrical flow path, and

(e) removing the chemical pulp from adjacent the bottom of the digester.

2. A method as recited in claim 1 wherein the second diameter is equal to or greater than the first diameter and comprising the further step (f), after step (d), and before step (e), of causing the downwardly moving slurry to move in a second diverging flow path having an initial diameter equal to or greater than the second diameter.

3. A method as recited in claim 2 comprising the further step of repeating steps (b), (c), (d), and (f) at least once prior to step (e).

4. A method as recited in claim 3 wherein both the first and second diverging flow paths diverge at a substantially constant angle to the vertical of between about 0.5-10^0.

5. A method as recited in claim 3 wherein the second flow path diverges at a substantially constant angle to the vertical of between about 0.5-5^0.

6. A method as recited in claim 1 comprising the further step of heating the liquid removed in the practice of step (c) and reintroducing the heated liquid into the digester adjacent where it was removed.

7. A method as recited in claim 1 wherein the first diverging flow path diverges at an angle to the vertical of between about 0.5-10^0, and step (b) is practiced using a substantially continuous screen surface.

8. A method as recited in claim 1 wherein the first diverging flow path diverges at a substantially constant angle to the vertical of between about 0.5-5^0.

9. A method as recited in claim 2 comprising the further [step of] heating the liquid removed in the practice of step (c) and reintroducing the heated liquid into the digester adjacent where it was removed.

10. A method as recited in claim 2 wherein the second flow path diverges at an angle to the vertical of between about 0.5-10^0, and step (b) is practiced using a substantially continuous screen surface.

11. A method as recited in claim 2 wherein the second flow path diverges at a substantially constant angle to the vertical of between about 0.5-5^0.

12. A method as recited in claim 8 comprising [the further step of] heating the liquid removed in the practice of step (c) and reintroducing the heated liquid into the digester adjacent where it was removed.

13. A method of treating a liquid slurry of comminuted cellulosic material in a substantially vertical vessel having at least one substantially annular screen surface, said method comprising [the steps of]:

(a) introducing the slurry into the vessel to flow substantially vertically therein through a first cylindrical passage defined by a cylindrical section of the vessel, and said slurry moving in a flow direction;

(b) while the slurry is flowing in the flow direction and in a diameter transition section of the vessel, below the first cylindrical passage screening the slurry to remove liquid therefrom while causing the liquid to diverge in the flow direction at an angle of between about 0.5-10^0 using the at least one screen surface, having a substantially constant screen surface opening size; and

(c) downstream of (b) in the flow direction and after the slurry flows through a second cylindrical passage below the diameter transition section, removing the slurry from the vessel.

14. A method as recited in claim 13 wherein steps (a)-(c) are practiced substantially continuously, and so that the flow direction is substantially downward.

15. A method as recited in claim 13 wherein the vessel has at least two diameter transitions, and wherein step (b) is practiced at or just downstream of each diameter transition prior to the practice of step (c).

16. A method as recited in claim 13 wherein (b) is practiced to cause the liquid to diverge in the flow direction at an angle of between about $0.5\text{-}5^0$.

17. A method as recited in claim 14 wherein the vessel has at least two diameter transitions, and wherein step (b) is practiced at or just downstream of each diameter transition prior to the practice of step (c).

18. A method of treating a liquid slurry of comminuted cellulosic material in a substantially vertical vessel having at least one substantially annular screen surface, said method comprising:

(a) introducing the slurry into the vessel to flow substantially vertically therein through a first cylindrical passage defined by a cylindrical section of the vessel, and said slurry moving in a flow direction;

(b) while the slurry is flowing in the flow direction and in a diameter transition section of the vessel, below the first cylindrical passage screening the slurry to remove liquid therefrom while causing the liquid to diverge in the flow direction at an angle of between 0.5^0 and 5^0 using the at least one screen surface; and

(c) downstream of (b) in the flow direction and after the slurry flows through a second cylindrical passage below the diameter transition section, removing the slurry from the vessel.

19. A method as recited in claim 18 wherein steps (a)-(c) so that the flow direction is substantially downward.

20. A method as recited in claim 18 wherein the vessel has at least two diameter transitions, and wherein step (b) is practiced at or just downstream of each diameter transition prior to the practice of step (c).

21. A method as recited in claim 18 wherein the at least one substantially annular screen surface comprises an assembly of bars each arranged in a direction aligned with the flow direction.

22. A method of treating a liquid slurry of comminuted cellulosic material in a substantially vertical vessel having at least one substantially annular screen surface, said method comprising:

(a) introducing the slurry into the vessel to flow substantially vertically therein through a first cylindrical passage defined by a cylindrical section of the vessel, and said slurry moving in a flow direction;

(b) while the slurry is flowing in the flow direction and in a diameter transition section of the vessel, below the first cylindrical passage screening the slurry to remove liquid therefrom while causing the liquid to diverge in the flow direction at an angle of approximately 0.5^0 using the at least one screen surface; and

(c) downstream of (b) in the flow direction and after the slurry flows through a second cylindrical passage below the diameter transition section, removing the slurry from the vessel.

23. A method of treating a liquid slurry of comminuted cellulosic material in a substantially vertical vessel having at least one annular screen surfaces, said method comprising:

(a) introducing the slurry into the vessel to flow substantially vertically therein through a first cylindrical passage defined by first cylindrical section of the vessel;

(b) moving the slurry in a flow direction though the first cylindrical and to a diameter transition section of the vessel that is below the first cylindrical passage, wherein a vertical length of the diameter transition section is substantially shorter than a length of the first cylindrical section;

(c) screening the slurry to remove liquid therefrom while causing the liquid to diverge in the flow direction at an angle of between 0.5^0 and 5^0 using the at least one screen surface;

(d) moving the slurry through a second cylindrical passage have a diameter substantially greater than a diameter of the first cylindrical passage, and wherein the second cylindrical passage is immediately downstream of the diameter transition section; and

(e) downstream of the second cylindrical passage below the diameter transition section, removing the slurry from the vessel.

24. The method as in claim 23 wherein the second cylindrical passage has a length substantially greater than the diameter transition section.

25. The method as recited in claim 23 wherein steps (a)-(e) so that the flow direction is substantially downward.

26. The method as recited in claim 23 wherein the vessel has at least two diameter transitions, and wherein the screening is practiced at or just downstream of each diameter transition.

27. The method as recited in claim 23 wherein the at least one substantially annular screen surface comprises an assembly of bars each arranged in a direction aligned with the flow direction.

28. The method as in claim 27 wherein the bars are trapezoidal and a gap between adjacent bars is substantially uniform along a length of the bars.